



KEEPING THE WORLD SAFE FROM STORMS IN SPACE

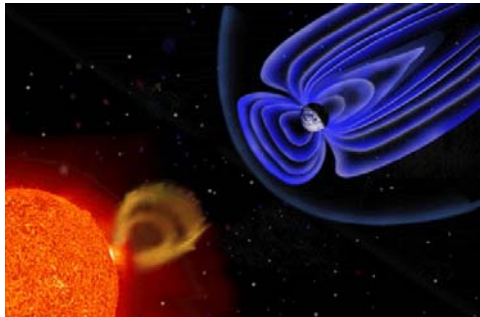
USTAR Funds New Space Weather Forecasting Center at USU to provide an early warning system to a satellite-dependent world

By Mary-Ann Muffoletto, Utah State University

In the course of today's activities you might send a text message, pay for your gasoline purchase at the pump or use your car's GPS system. You'll likely depend on electricity supplied by a power grid, natural gas from a pipeline, products delivered by long-haul trucks, trains or planes and your Internet connection. All of these activities are dependent on satellites, which makes all of them vulnerable to unpredictable forces miles beyond Earth's atmosphere: the volatile manifestations of space weather.

"Space weather disturbances can wreak havoc on human systems and operations," says Robert Schunk, Utah State University physics professor and director of USU's new International Center for Space Weather Forecasting. "As society becomes more dependent on sophisticated space-borne and ground-based technological systems, forecasting space weather becomes crucial to our economy, safety and security."

USU's longtime research on space weather forecasting recently received a boost with the approval of Utah Science Technology and Research Initiative – USTAR – funding to establish the new center and build on the university's expertise in developing forecast models for Earth's upper atmosphere and ionosphere.



"Regions beyond Earth's atmosphere display highly variable and turbulent densities, temperatures and winds," Schunk says. "These space weather disturbances are particularly severe during geomagnetic storms when bursts of hot plasma from the Sun interact with the Earth's magnetic field."

The resultant surges in radiation levels and tornado-force cosmic wind gusts disrupt over-the-horizon radars, high frequency communications, global positioning navigation systems, military surveillance operations, worldwide pipelines, NASA's deep space tracking network and Federal Aviation Authority tracking systems. Space weather is an ever present hazard for the International Space Station, shuttle flights and the ever growing legion of satellites rotating the Earth.

“Economists estimate that space weather costs the global economy from \$200 to 400 million each year,” Schunk says. “With regard to security, the U.S. military relies on space weather warnings to protect satellites and ground-based systems that support our armed forces. System failures can cost lives.”

As part of a U.S. Department of Defense-funded research program, USU has developed two physics-based data assimilation models for the upper atmosphere and ionosphere in an effort called Global Assimilation of Ionospheric Measurements or GAIM.

The GAIM team, which consists of Schunk and Physics Department colleagues Jan Sojka, Ludger Scherliess, Donald Thompson and Lie Zhu, along with USU students, created the models to provide specifications and forecasts for global, regional and local distributions of upper atmosphere/ionosphere densities, temperatures and winds.

“These models have garnered worldwide attention and are commercially viable,” Schunk says. “With the USTAR funding, we plan to provide real-time specifications and forecasts of upper atmosphere and ionosphere weather and have customers subscribe to the service.”

USTAR will provide multi-year funding to establish the USU center, which will be housed in the USU Physics Department’s existing Center for Atmospheric and Space Sciences.

“Our immediate plans include hiring a director of the service center we’re creating, along with an expert on Sun-to-Earth transport phenomena and a space weather applications expert,” Schunk says. “In addition, we will hire several post-doctorate researchers and graduate students to work on various topics with the different team members.”

Ultimately, he says, a spin-off company will be created from the USU service center when its revenue is large enough to sustain the operation.

“The space weather team builds on USU’s strengths in atmospheric and space sciences,” says Charles Precourt, board member of the USTAR Governing Authority. “The university’s programs in these areas have flourished for many years, and we’re excited to further these efforts. We also see a considerable commercialization opportunity.”

Schunk agrees. “It’s a golden opportunity,” Schunk says. “USU can have a tremendous impact on the safety, security and quality of life for people throughout the world.”

Related Links

USU Center for Atmospheric and Space Sciences - www.usu.edu/cass/index.htm

USU Physics Department - www.physics.usu.edu

USU College of Science - www.usu.edu/science

Innovation Utah - www.innovationutah.com

ABOUT USTAR

The Utah Science Technology and Research initiative (USTAR) is a long-term, state-funded investment to strengthen Utah's "knowledge economy" and generate high-paying jobs. Funded in March 2006 by the State Legislature, USTAR is based on three program areas. The first area involves funding for strategic investments at the University of Utah and Utah State University to recruit world-class researchers. The second area is to build state-of-the-art interdisciplinary facilities at these institutions for the innovation teams. The third program area involves teams that work with companies and entrepreneurs across the State to promote science, innovation, and commercialization activities. For more information, go to www.innovationutah.com.

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